

# **TRANSLATION**

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## **Protective gas for the non-vacuum electron-beam welding of metallic materials**

The invention relates to a protective gas for the non-vacuum electron-beam welding of metallic materials, particularly light metals.

Helium, which has been used up until now as the protective gas in the non-vacuum electron-beam welding (NV-EBW) of metallic materials, particularly light metals such as aluminum in automotive production, and which is employed at a temperature that corresponds to the ambient temperature, is only available in limited amounts, as a result of which its use is expensive.

With this in mind, the invention is based on the objective of providing a protective gas for the non-vacuum electron-beam welding of metallic materials, particularly light metals, that allows cost-effective as well as high-quality processing of the materials.

This objective is achieved according to the invention by means of a protective gas consisting of cold gas.

A low-reactivity gas, advantageously inexpensive nitrogen (evaporation temperature of  $-196^{\circ}\text{C}$  [ $-320.8^{\circ}\text{F}$ ]) or an inert gas, preferably helium (boiling temperature of  $-269^{\circ}\text{C}$  [ $-452.2^{\circ}\text{F}$ ]), is employed according to the invention as the cold gas.

The protective gas according to the invention, consisting of cold gas, for the non-vacuum electron-beam welding of metallic materials, particularly light metals such as aluminum in automotive production, allows cost-effective as well as high-quality processing of the materials.

Moreover, the use according to the invention of cold-gas protective gas in the non-vacuum electron-beam welding of metallic materials accounts for better focusing properties of the beam because of the reduced particle movement.